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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Gustav Wallmark et al

TITLE: METHOD AND MEANS FOR 2-D-GEL-IMAGE SEGMENTATION

AMENDED CLAIMS

1-21. (cancelled)

22. (new) A method for segmenting a 2D gel image by associating initial protein seed candidates with surrounding regions, comprising the steps of:

- defining at least one interface circumscribing an initial seed in its immediate surrounding,
- defining a velocity function $F(x, y)$ for said interface,
- bringing said interface to evolve in accordance with $F(x, y)$,
- defining at least one stopping criterion C and stopping the evolution of said interface in accordance with said criterion,
- associating the area inside said stopped interface with said initial seed.

23. (new) The method according to claim 22, comprising the steps of:

- calculating the time of arrival, $T_a(x, y)$ for said evolving interface in pixels surrounding said initial seed
- defining said stopping criterion C so that C depends on $T_a(x, y)$ in the pixel representing the latest circumscribed pixel by said evolving interface and/or functions thereof.

24. (new) The method according to claim 23 wherein said stopping criterion C depends on the gradient T_a' of $T_a(x, y)$ in the pixel representing the latest circumscribed pixel by said evolving interface and/or functions thereof.

25. (new) The method according to claim 22, wherein said stopping criterion C is defined so that C depends on $F(x, y)$ and/or functions thereof.

26. (new) The method according to claim 22, wherein the evolution of said interface is carried out by

- defining and calculating a time of arrival, $T_a(x, y)$, for a set of trial candidate pixels,
- identifying the trial candidate pixel P_{Tmin} with the smallest T_a , and
- letting the interface evolve to said trial candidate pixel P_{Tmin} .

27. (new) The method according to claim 26, comprising the step of

- rejecting a trial candidate pixel as a candidate pixel if it is established that said candidate trial pixel constitutes a pixel representing a known pixel associated with an

evolving interface originating from another initial seed.

28. (new) The method according to claim 22, wherein the evolution of said interface is carried out by:

- an iterative calculation of $T_a(x, y)$ for a set of candidate pixels,
- defining and calculating a departure time, T_d , for said candidate pixels,
- identifying the candidate pixel P_{Td} with the smallest T_d ,
- letting the interface propagate to said pixel points, P_{Td} , outside or inside neighbours depending on the sign of the speed function F in said point P_{Td} .

29. (new) The method according to claim 28, comprising the step of

- rejecting a trial candidate pixel as a candidate pixel if it is established that said trial candidate pixel constitutes a pixel representing a known pixel associated with an evolving interface and that the value of the speed function $F(x, y)$ in said trial candidate pixel is positive.

30. (new) The method according to claim 22, comprising the following steps

- defining a first function $F_1(x, y)$,
- defining at least a second function $F_2(x, y)$ differing from $F_1(x, y)$,
- defining a criterion C2 for at least an amount of pixels inside a region of said image, wherein said criterion C2 defines whether $F_1(x, y)$ or $F_2(x, y)$ is valid for said amount of pixels.

31. (new) The method according to claim 30, wherein said criterion C2 is a criterion for identifying saturated regions.

32. (new) The method according to claim 22, wherein $F(x, y)$ depends on the intensity function $I(x, y)$ for said image and/or functions thereof.

33. (new) The method according to claim 22, wherein $F(x, y)$ depends on the distance to said initial seed and/or functions thereof.

34. (new) The method according to claim 22, wherein $F(x, y)$ depends on the curvature of said evolving interface and/or functions thereof.

35. (new) The method according to claim 22, wherein $F(x, y)$ depends on the normal direction of said evolving interface and/or functions thereof.

36. (new) The method according to claim 22, wherein $F(x, y)$ depends on the curvature of the intensity function $I(x, y)$ and/or functions thereof.

37. (new) The method according to claim 22, wherein $F(x, y)$ depends on the gradient $G(x, y)$ of the intensity function $I(x, y)$ for said image and/or functions thereof.

38. (new) The method according to claim 22, wherein $F(x, y)$ depends on the shape of said evolving interface and/or functions thereof.

39. (new) The method according to claim 22, wherein $F(x, y)$ depends on the angle between the intensity gradient, \bar{G} , of $I(x, y)$, and a vector \bar{V} representing the

instantaneous distance to (x, y).

40. (new) A computer program element to be used for the segmentation of a 2D gel image by associating initial protein seed candidates with surrounding regions, said program element comprising computer program code means making a computer execute the steps defined by any of above claims 22-39.

41. (new) A computer readable medium, comprising computer program code means making a computer execute the steps defined by any of above claims 22-39.

42. (new) A system for processing 2D gel images comprising a computer, wherein said computer has access to a program element computer to be used for the segmentation of a 2D gel image by associating initial protein seed candidates with surrounding regions, said program element comprising computer program code means making a computer execute the steps defined by any of above claims 22-39.